BTEC Assignment Brief

Qualification	Pearson BTEC International Level 3 Foundation Diploma in Engineering Pearson BTEC International Level 3 Diploma in Engineering Pearson BTEC International Level 3 Diploma in Electrical/Electronic Engineering Pearson BTEC International Level 3 Diploma in Mechanical Engineering Pearson BTEC International Level 3 Diploma in Digital Engineering Pearson BTEC International Level 3 Diploma in Manufacturing Engineering Pearson BTEC International Level 3 Extended Diploma in Engineering Pearson BTEC International Level 3 Extended Diploma in Electrical/Electronic Engineering Pearson BTEC International Level 3 Extended Diploma in Mechanical Engineering Pearson BTEC International Level 3 Extended Diploma in Digital Engineering Pearson BTEC International Level 3 Extended Diploma in Manufacturing Engineering
Unit number and title	**Unit 27: Static Mechanical Principles in Practice**
Learning aim(s)	**B:** Explore safely the shear forces and bending moments in simply supported and cantilever beams
Assignment title	Shear force and bending moments
Assessor	
Issue date	
Hand in deadline	

Vocational Scenario or Context	You are a second year technical apprentice in a large manufacturing company producing structural members that are to be used in a new construction project. Your supervisor has asked you carry out some experiments to find out how beams react to different types of loading, and then perform a number of calculations to confirm the findings of the experiments. The experiments and calculations relate to shear and bending in beams.

Task 1	You need to produce a report that demonstrates analytical and practical skills and use these to explain the effects of loads on simply supported and cantilever beams, suggesting improvements to the structures. **To do this:** Your tutor will provide you with diagrams of two simply supported beams and a cantilever beam, each of which will have at least three point loads. You need to: • Create a mathematical model of the shear force and bending moments for each beam arrangement. For each you need to present your findings as annotated shear force and bending moment diagrams. • Use your diagrams to identify significant data,

	including maximum and minimum values, and points of contraflexure • Safely set up apparatus for each beam arrangement using simple and complex loading. Once set up, you need to gather experimental results for each beam. **You then need to:** Your tutor will provide diagrams of two further simply supported beams and a further cantilever beam. These beams each have at least two point loads and one uniformly distributed load. You should use the diagrams to: • Create a mathematical model of the shear force and bending moments for each beam arrangement. For each you need to present your findings as annotated shear force and bending moment diagrams. • Use your diagrams to identify significant data, including maximum and minimum values, and points of contraflexure. • Safely set up apparatus for each beam arrangement using simple and complex loading. Once set up, you need to gather experimental results for each beam. Once you have completed all of your experiments you need to produce a short report in your log book that considers both the theoretical values and the measured values for each of the various beam arrangements. In your report you will need to evaluate (give reasons for) the differences between the theoretical values and experimental values, including ways that you could improve (e.g. the experimental accuracy) the experiments if they were repeated.
Checklist of evidence required	A portfolio of results gathered by experimentation when investigating given beam configurations. Supported by a log book, images, observation records, graphical and mathematical modelling (including differential calculus) Observation records should contain sufficient information about how you approached the practical tasks, set up the equipment, took measurements and processed them.

Criteria covered by this task:	
Unit/Criteria reference	To achieve the criteria you must show that you are able to:
27/B.D2	Evaluate the simple and complex loads acting on simply supported and cantilever beams, comparing the results from safely conducted experiments and theoretical calculations, and suggest improvements to the experimental method used.
27/B.M2	Conduct experiments accurately to determine the shear forces and bending moments in simply supported and cantilever beams when subjected to simple and complex loading
27/B.M3	Analyse, using experimental results and theoretical calculations, the shear forces and bending moments in simply supported and cantilever beams when subjected to simple and complex loading.
27/B.P3	Conduct experiments safely to determine the shear forces and bending moments in simply supported and cantilever beams when subjected to simple loading.
27/B.P4	Explain, using experimental results and theoretical calculations, the shear forces and bending moments in simply supported and cantilever beams when subjected to simple loading.
Sources of information to support you with this Assignment	Textbooks Andrew Buckenham, Gareth Thomson, Natalie Griffiths, Steve Singleton, Alan Serplus, Michael Ryan (2016) BTEC Nationals in Engineering, Pearson, ISBN 9781292141008 Boyce A., Cooke E., Jones R., Mantovani B., Roberts D., Weatherill B., (2010) BTEC Level 3 National Engineering Student Book (Level 3 BTEC National Engineering), Pearson Educational, ISBN 978 1 84690 754 1 Tooley M. and Dingle L. (2010) BTEC National Engineering, Elsevier, ISBN 978 0 12 382202 4 Websites thelearningpoint.net/home/engineering-mechanics/analysis-of-structures